Programmer's Manual

EP-2000

Firmware Description

	Name and Family Name	Occupation	Data	Signature
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Diagnostic Inforamation, Dump Mode, Firmware Updating	
Holding **LF** button while power **on** for **~ 0.5** sec and releasing it after the **1-beep**.	SHORT **SELF TEST** print.
Holding **FEED** button while power **on** for **~ 2.5** sec and releasing it after the **2-beep**.	It starts **Hex DUMP mode**. All input data are printed hexadecimal and as text
Holding **LF** button while power **on** for **~ 4.5** sec and releasing it after the **3-beep**.	LONG **SELF TEST** print
Holding **FEED** button while power **on** for **~ 6.5** sec and releasing it after the **4-beep**.	**Entering hardware setup mode (hardware menu)**
Holding **FEED** button while power **on** for more than **8.5** sec and releasing it after the **5-beep 4-tone beep.**	**Program mode –** loading the printer firmware.

Protocol mode

Protocol mode is active when the memory switch **11** is **on**. The purpose of this mode is to give full control over the optional peripherals (MC and smart card reader) and a stronger real time access to the printer. All input data are sent in packets as described below. The printer returns an answer to the packet immediately.

Output packet format:	**Channel Command LenHi LenLo Data**	
Answer format:	**Channel Status LenHi LenLo Data**	
Channel:	One byte:	**Bits 0 – 6** Channel number (Device Type) **Bit 7** **0:** Send data; **1:** Response
Command:	One byte with possible value:	**0:** Open channel (No action – all channels always open) **1:** Close channel (No action – all channels always open) **2:** Send data **3:** Request data **> 4:** Application specific

Status: One byte:

	0	1
Bit 0	No error	Error occured
Bit 1	ACK (Packet accepted)	NACK (Packet not accepted)
Bit 2	Channel and command OK	Wrong channel or command
Bit 3	Battery OK	Low battery
Бит 4	Printing head OK	Printing head too hot
Bit 5	Paper OK	Out of paper
Bit 6	Not defined	
Bit 7	Printer ready	Printer busy

	Bit 7 is set, if: • There are unprinted lines in the print buffer. • There are bytes in the print buffer. • The printer is executing a macro. • The printer is executing a selftest. • The button **<LF>** is pressed – feeding paper.
LenHi:	Hihg byte of data length of data. **From 00h too 08h.**
LenLo:	Lowg byte of data length of data. **From 00h to FFh.**
Data:	**256*LenHi +LenLo** data bytes.

The **maximum** packet **length** is **2048 bytes.**

The answer differs from the command by **bit 7** (MSB) in the channel number. If **bit 7** is **'0'**, then it is a command, if it is **'1'** – it is a response. Bit **'0'**in the **Status** byte shows if there was an error accepting or processing the data block. If this bit is **'1'** the other bits show the type of the error.

The printer never issues a transmission by itself. It always responds as an answer to a command. **The communication goes like this:**

Host – command, Printer – answer; Host – command, Printer – answer; etc.

The defined channel is:

1	Printer.

Commands for the printer channel 1:

Command 2	Send data. The data is copied into the printer's print buffer. If there"s not enough space into the print buffer, the packet is rejected, and a status byte with value **3** is returned in the answer.
Command 3	Receive data If there is data to be transmitted from the printer to the host, it is transmitted in the data field of the packet, otherwise an empty packet is received. The application must take care to get the data fast enough from the output buffer or the data may be corrupt.

Command 4	Get printer status. 5 data bytes returned in response: **BufferHi BufferLo PrStatus Volt Temperature**	
	BufferHi	High byte of the count of free bytes in input buffer.
	BufferLo	Low byte of the count of free bytes in input buffer.
	PrStatus	Printer status. The following bits defined:
		Bit 0 Battery low
		Bit 1 Too hot
		Bit 2 No paper
	Volt	The battery voltage in units 0.1V
	Temperature	The head temperature in degrees Celsius.

If free bytes in input buffer are more than **65535 (FFFFh)**, then **FFFFh** is returned.

Communication example (all bytes hexadecimal):

Send data:	>>> 01 02 00 05 11 22 33 44 55 <<< 81 00 00 00
Send data with error:	>>> 01 02 00 05 11 22 33 44 55 <<< 81 01 00 00 >>> 01 02 00 05 11 22 33 44 55 <<< 81 01 00 00 >>> 01 02 00 05 11 22 33 44 55 <<< 81 00 00 00
Receive data:	>>> 01 03 00 00 <<< 81 00 00 00 >>> 01 03 00 00 <<< 81 00 00 04 11 22 33 44 >>> 01 03 00 00 <<< 81 00 00 00
Get status:	>>> 01 04 00 00 <<< 81 00 00 05 3F F8 01 49 27

Serial Interface

Turn off the printer before attaching the cable. After connecting the connectors screw the two screws.

Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Serial port parameters	1 start bit, 8 data bits, 1 stop bit, no parity
Signal characteristics	RS232C Mark – logical 1 (-3V до –12V) Space – logical 0 (+3V до +12V)

Input-output Signals

RD	Serial input data signal
TD	Serial output data signal
DSR	Dataflow control signal – INPUT
DTR	Dataflow control signal – OUTPUT
GND	Ground

Signal Description

Start bit	One “Space” level bit. Indicates the beginning of data byte.
Data bits	Eight consequent bits. First is the least significant bit.
Stop bit	One “Mark” level bit. Indicates the end of the byte.

Dataflow Control

If a hardware protocol is selected the computer could send data only at “Space” level on the DTR line. Data reception is disabled when the buffer is close to its upper limit.
Reception is re-enabled when the number of bytes in the buffer is below some limit.

Page mode

DK-2300 supports page mode. For this mode is needed larger RAM, so it is possible, that some of the older printers will not support it. You can check this using command **ESC Z** (bit **29.6** will be set if page mode is supported).

New **13** commands are added in page mode, most of the old command work differently.

In standard mode the device prints the data after receiving new line command (**LF** or **CR** depending on memory switches) or when the line is wider than the defined print area.

In page mode the result of incoming commands is forwarded to a reserved memory area (page). The page place and size is defined using command **ESC W**. Command **GS T** selects the print direction in this page. At the end the collected information is printed using one of the commands, provided for this. Commands **ESC FF** and **GS FF** print only the currently defined page, but command **ESC Z** prints the area between the first and last line containing at least one black point.

All commands except **GS L** and **GS W** work in page mode. The centering and right alignment (command **ESC a**) is working in the currently defined page width.

Ruled lines

New commands are added to make printing tables in standard and page mode easier.

The printer has two line buffers with size the maximum printing width (paper width in standard mode or the selected page width in page mode). When ruled lines are active, then every horizontal line of the text line is combined with the selected ruled line buffer. Bit '1' in the ruled line buffer is a black dot in OR mode and inverts the color of the dot in XOR mode. Two commands allow the ruled line buffers to be printed without combining with a text line.

When pressing the **FEED** button, no ruled lines buffer is applied.

All ruled lines commands start with symbol **DC3** (ASCII code 13h).
Please see command **DC2 =** , too .

Warning!

*The ruled lines print position depends not on **GS L** and **GS W** (left margin and line width) and is always at the beginning of the line (or at the beginning of the printable area in page mode). The printed text and graphic change their position according these commands.*

*When printing 180 degrees rotated lines (command **ESC {**) ruled lines buffers are not rotated!*

№	Command	Description	page
1	**BEL**	Sounds the buzzer	12
2	**HT**	Horizontal Tab command	12
3	**LF**	Printing a line and Paper Feeding command	12
4	**FF**	Printing and paper feeding to the black mark position	12
5	**CR**	The operation of the command depends on the state of the configuration flags 2, 3 and 4	13
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17	**DC3 P**	Ruled line 1 dot line print	18
18	**DC3 p**	Ruled line **n** dots line print	18
19	**DC3 v**	Ruled line image write	19
20	**CAN**	Canceling print data in page mode	19
21	**ESC FF**	Printing data in page mode	19
22	**ESC RS**	Sounds the buzzer	19
23	**ESC SP**	Setting character spacing	20
24	**ESC #**	Setting EURO symbol position	20
25	**ESC $**	Specifying the absolute horizontal position of printing	20
26	**ESC %**	Selecting/Canceling the printing of downloaded user character sets	21
27	**ESC &**	Selecting user character set	21
28	**ESC !**	Specifying printing mode of text data	22
29	**ESC ***	Printing graphical data	23

№	Command	Description	page
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31	ESC .	Printing self test/diagnostic information	26
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33	ESC 3	Specifying line feed rate n/203 inches	27
34	ESC <	Changes print direction to opposite	27
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36	ESC >	Selecting print direction	28
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38	ESC D	Setting horizontal tab position	29
39	ESC E	Specifying/Canceling highlighting	29
40	ESC F	Filling or inverting the page area in page mode	29
41	ESC G	Specifying/Canceling highlighting	30
42	ESC I	Specifying/Canceling Italic print	30
43	ESC J	Printing and Paper feed n/203 inches	30
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45	ESC N	Reading programmed serial number	31
46	ESC R	Selecting country	31
47	ESC S	Specifying speed (bps) of the serial port	31
48	ESC T	Printing short self test	32
49	ESC U	Selecting/Canceling underlined printing	32
50	ESC V	Selecting/Canceling printing 90°- right turned characters	32
51	ESC W	Defining the print area in page mode	33
52	ESC X	Specifying max printing speed	33
53	ESC Y	Selecting intensity level	34
54	ESC Z	Returning diagnostic information	34
55	ESC \	Specifying relative horizontal position	36
56	ESC]	Loading the default settings stored in Flash memory	36
57	ESC ^	Saving current settings in Flash memory	36
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59	ESC `	Reading the Battery Voltage and Thermal head temperature	37
60	ESC a	Aligning the characters	38
61	ESC b	Increasing text line height	38
62	ESC c5	Enabling/Disabling the functioning of the button LF	38
63	ESC d	Printing and feeding paper by n- lines	39

№	Command	Description	page
64	ESC f	Select symbol ‘0’ printing style	39
65	ESC i	Feeding paper backwards	39
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67	ESC p	Generating a drawer pulse	40
68	ESC r	Full command for sounding buzzer	40
69	ESC s	Reading printer settings	42
70	ESC u	Selecting code table	43
71	ESC v	Transmitting the printer status	45
72	ESC y LAN	Programming setting LAN	45
73	ESC {	Enabling/Canceling printing of 180° turned characters	45
74	GS FF	Printing in page mode and returning to standard mode	46
75	GS $	Specifying the absolute vertical position in page mode	46
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81	GS C	Read the Real Time Clock	49
82	GS H	Selecting printing position of HRI Code	49
83	GS L	Setting the left margin	50
84	GS Q	Printing 2-D barcodes	50
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92	GS Z	Printing the non blank page area only in page mode	55
93	GS \	Specifying the relative vertical position in page mode	55
94	GS ^	Executing macro	56
95	GS c	Setting the Real Time Clock	56

№	Command	Description	page
96	GS f	Setting the font of HRI characters of the barcode	57
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99	GS p	Settings for 2D barcode PDF417	61
100	GS q	Selecting the height of the module of 2D barcode PDF417	61
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Asian Languages Support

103	GS x	Direct text print in page mode	63
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105	FS -	Selecting/Canceling underline mode for two-byte text mode	64
106	FS .	Canceling two-byte text mode	64
107	FS 2	Defining one custom Kanji character	64
108	FS C	Selecting Shift-JIS mode (Japanese version only)	65
109	FS S	Specifying character spacing for two-byte text mode	65
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Command Details

1. (BEL) Sounds the Buzzer

Code	**[07h]**
Description	By executing this command the buzzer will beep.

2. (HT) Horizontal Tab command

Code	**[09h]**
Description	Shifts the printing position to the next horizontal tab position. The horizontal tab position is set by **ESC D**. By default the horizontal tab position is at each 8th character (in 9th, 17th, 25th column) from **FONT A**.

3. (LF) Printing a line and Paper Feeding command

Code	**[0Ah]**
Description	Prints data stored in input buffer and feeds paper with one line (the height of a line that has been set).

4. (FF) Printing and paper feeding to the black mark position

Code	**[0Ch]**
Description	This command prints the data in the printer buffer and searches for black mark. It is ignored if black mark mode is not specified.
⚠ ***Notes for Black Mark Function***	**1. Error detection in black mark mode:** **Paper end** is not checked during printing and also black mark is not checked. After receiving **FF** command, printer checks **black mark** and **paper end**. Once black is detected and white is detected again within **6 mm** paper feed, it is determined as a black mark. If the white is not detected within 6 mm paper feed, it is determined as paper end. After receiving **FF** command, if printer cannot detect black mark by feeding paper for **360 mm**, printer recognizes it as black mark detecting error. And the result is same as detecting **paper end**. To release the error, it is necessary to put correct paper and press **LF** switch long (for more than 1 sec).

	2. LF switch operation in black mark mode: **Pressing short:** Feeds one line. **Pressing for >1 sec:** Feed paper to find next black mark. (The same as sending **FF** command).
Remarks for programming **Remarks on handling**	**1.** As it is possible to print on black mark, if user does not want to print on the black mark, it have to be taken care by user side program. **2.** If the paper cover is open in black mark mode, there is a possibility to recognize it as detecting black mark.

5. (CR) The operation of the command depends on the state of the configuration flags 2, 3 and 4

Code	**[0Dh]**
Description	This command is ignored or its action is the same as **LF** depending on the state of memory switches set with last command **GS)**.

6. (DC2 =) Image LSB/MSB select

Code	**[12h] + [3Dh] + n**	
Description	The command selects whether the left edge of print image is the LSB or MSB for commands **GS ***, **DC3 F** and **DC3 v**.	
	n is from **0** to **FFh**, but only least significant bit checked:	
	0	LSB is the left edge.
	1	MSB is the left edge.
	The default value is 1.	
The command is supported in firmware **version 1.51** or higher.		

7. (DC3 ( ) DC3 (Ruled line) commands sequence start

Code	**[13h] + [28h]**
Description	Following this command the printer receives **DC3** commands without DC3 symbol at the beginning. The symbol '**)**' ends the sequence. All commands, which are not **DC3** commands, are ignored.
The command is supported in firmware **version 1.51** or higher.	

8. (DC3 +) Sets the ruled line ON

Code	**[13h] + [2Bh]**
Description	After receiving this command every printed line is combined with the selected ruled line buffer. This happens when commands **LF**, **ESC J**, **ESC d**, **DC3 P**, **DC3 p** are executed. Depending on last command **DC3 M** executed the ruled line buffer is combined with the text using OR (if there is a bit '**1**' in ruled line buffer, a black dot is printed) or XOR (if there is a bit '**1**' in ruled line buffer, then the corresponding dot is inverted). All **DC3** command except **DC3 P** and **DC3 p** are executed when ruled line mode is off, too. Su the ruled line buffers can be cleared or set before this command. The command **DC3** – sets ruled lines **off**. In page mode nothing is printed outside the selected using **ESC W** area. The command does not clear rule line buffers. By **default** ruled lines are **disabled**.
The command is supported in firmware **version 1.51** or higher.	

9. (DC3 -) Sets the ruled line OFF

Code	**[13h] + [2Dh]**
Description	The command disables ruled line mode. All **DC3** command except **DC3 P** and **DC3 p** are executed when ruled line mode is off, too. Su the ruled line buffers can be cleared or set after this command. The command **DC3 +** sets ruled lines **on**. The command does not clear rule line buffers. By **default** ruled lines are **disabled**.
The command is supported in firmware **version 1.51** or higher.	

10. (DC3 A) Selects ruled line buffer A

Code	**[13h] + [41h]**
Description	Makes ruled line buffer **A** active. All **DC3** commands for clearing or setting data use the active ruled line buffer. When ruled line is enabled, then printing a line and commands **DC3 P** and **DC3 p** use this buffer. By **default** buffer **A** is **selected**.
The command is supported in firmware **version 2.00** or higher.	

11. (DC3 B) Selecs ruled line buffer B

Code	**[13h] + [42h]**
Description	Makes ruled line buffer **B** active. All **DC3** commands for clearing or setting data use the active ruled line buffer. When ruled line is enabled, then printing a line and commands **DC3 P** and **DC3 p** use this buffer. By **default** buffer **B** is **selected**.
The command is supported in firmware **version 1.51** or higher.	

12. (DC3 C) Clears selected ruled line buffer

Code	**[13h] + [43h]**
Description	Clears selected ruled line buffer (Sets all bits to 0). After power on or command **ESC @** both buffers are clear. Entering or leaving ruled line mode (**DC3 +** and **DC3 -**) does not clear ruled line buffers.
The command is supported in firmware **version 1.51** or higher.	

13. (DC3 D) Sets a single dot in selected ruled line buffer

Code	**[13h] + [44h] + nL + nH**
Description	Set to '**1**' one bit of the active ruled line buffer. The dot coordinates are **nL+256*nH**. Coordinates outside the printable area are ignored.
The command is supported in firmware **version 1.51** or higher.	

14. (DC3 F) Ruled line pattern set

Code	**[13h] + [46h] + n1 + n2**
Description	The command fills the selected ruled line buffer with the data sequence **n1**, **n2**. Permitted values: 0-FFh. Every byte sets **8 dots**, last executed command **DC2 =** determines whether the MSB is the left or the right side. The existing data in the buffer are replaced with the new data. Dots outside the printable area are ignored.
The command is supported in firmware **version 1.51** or higher.	

15. (DC3 L) Ruled line line set

Code	**[13h] + [4Ch] + mL + mH + nL + nH**
Description	The command sets to '**1**' the bits between to specified coordinates in the selected ruled line buffer. The coordinates are **mL+256*mH** and **nL+256*nH**. The part of the line outside the printable area is ignored.
The command is supported in firmware **version 1.51** or higher.	

16. (DC3 M) Selects ruled line combine mode

Code	**[13h] + [4Dh] + n**	
Description	The command selects the logical operation between the selected ruled line buffer and the print buffer when ruled line is enabled.	
	n is from 1 to FFh, but only the LSB is used:	
	0	OR operation – bit '**1**' in ruled line buffer sets a black dot on paper.
	1	XOR operation – bit '**1**' in ruled line buffer inverts the dot.
	For commands **DC3 P**, **DC3 p** and when printing an empty line the logical operation doesn't matter. Logical operation XOR is useful to invert the whole height of a text line (white letters on black background). By **default OR** mode is **selected** (value **0**).	
The command is supported in firmware **version 1.51** or higher.		

17. (DC3 P) Ruled line one dot line print

Code	**[13h] + [50h]**
Description	The active ruled line buffer is printed as a single line (**0.125 mm** high). If ruled line is off, then the paper is moved one line (**0.125 mm**) without printing. If there are graphic or text data in the line, they are ignored (erased). The same effect will have command **ESC 3 [01h]** without text or graphic data in the line.
 Warning!	Because of the characteristics of thermal printing it is possible, that the quality of single horizontal lines on the paper is not good.
The command is supported in firmware **version 1.51** or higher.	

18. (DC3 p) Ruled line n dot line print

Code	**[13h] + [70h] + nL + nH**
Description	The selected ruled line buffer is repeated on **nL+256*nH** lines. If ruled line is off, then the paper is moved **nL+256*nH** dots without printing. If there are graphic or text data in the line, they are ignored (erased). The same effect will have command **ESC 3 n** without text or graphic data in the line (the difference is, that the possible line height is **up to 255 dots**)
 Warning!	Because of the characteristics of thermal printing it is possible, that the quality of single horizontal lines on the paper is not good.
The command is supported in firmware **version 1.51** or higher.	

19. (DC3 v) Ruled line image write

Code	**[13h] + [76h] + nL + nH + D_1 + …**
Description	The command fills the selected ruled line buffer with **nL+256*nH** data bytes. **Possible values** of data bytes: **0 – FFh**. Every byte defines **8 dots**, last executed **DC2 =** determines whether MSB is left or right side. Selected ruled line buffer is erased and new data are written. **Dots outside** the printable area **are ignored**.
The command is supported in firmware **version 1.51** or higher.	

20. (CAN) Canceling print data in page mode

Code	**[18h]**
Description	The command clears the currently selected page area and sets current print position to coordinates (0, 0) in the current page (depending on the currently selected print direction with command **GS T**). The command is not valid in standard mode.
The command is supported in firmware **version 1.51** or higher.	

21. (ESC FF) Printing data in page mode

Code	**[1Bh] + [0Ch]**
Description	The command executes a batch printout of the data, mapped in the currently selected page. The printer continues to work in page mode and data is not destroyed, so the command may be executed many times. The command is not valid in standard mode.
The command is supported in firmware **version 1.51** or higher.	

22. (ESC RS) Sounds the buzzer

Code	**[1Bh] + [1Eh]**
Description	By executing this command the buzzer will beep.

23. (ESC SP) Setting character spacing

Code	**[1Bh] + [20h] + n**
Description	The rightward space amount is set in dot unit (1/203 inch unit). The initial value is **n**=0. When the font size is doubled the space between characters is also doubled. Possible values: **from 0 to 63 dots.**
	[0 <= **n** < 40h]

24. (ESC #) Setting EURO symbol position

Code	**[1Bh] + [23h] + n**	
Description	This command forces the **EURO** symbol to appear at the selected ASCII code. So when a code table without EURO symbol is selected, the user can use this symbol at the desired place. The original character with this ASCII code becomes inaccessible until redefinition using the same command. ASCII codes from **00H to 1FH** disable **EURO substitution** and the selected code table is printed unchanged. **Default value** is **00H** (EURO substitution disabled).	
	0 <= **n** <= FF	The ASCII code of EURO symbol.

25. (ESC $) Specifying the absolute horizontal position of printing

Code	**[1Bh] + [24h] + n1 + n2**	
Description	The shifting is **n1 + 256*n2** dots. Specifying beyond the line end is ignored.	
	0 <= **n1** <= FF	Horizontal shifting in dots (least significant byte LSB)
	0 <= **n2** <= 02	Horizontal shifting in dots (most significant byte MSB)

26. (ESC %) Selecting/Canceling the printing of downloaded user character sets

Code	**[1Bh] + [25h] + n**	
Description	Character set is defined by the command **ESC &**. The chosen character set is kept even if printer is switched off.	
	n can be from **0 to 255**, but only the Least significant bit (LSB) is important:	
	0	Canceling selection of user characters (default characters set is chosen)
	1	Loaded user character set is chosen

27. (ESC &) Selecting user character set

Code	**[1Bh] + [26h] + a + n + m + $D1_1$ + … + $D_{(m-n+1)k}$**	
Description	**a**	Number of the sub-command and can be: **0** or '**0**': Copies **internal** character **set A** over **user** character **set A**. All parameters after the number of the command are omitted. **1** or '**1**': Copies **internal** character **set B** over **user** character **set B**. All parameters after the number of the command are omitted. **2** or '**2**': Defines a sequence of characters **for Font A (12x24).** **3** or '**3**': Defines a sequence of characters **for Font B (9x16).** **4** or '**4**': Defines a sequence of characters **for Font B (9x16).**
	20h <= **n** <= **m** FFh	
	n	The ASCII code of the first of the (**m-n+1**) consecutive characters.
	m	The ASCII the last of the (**m-n+1**) consecutive characters. When only one symbol is defined **m=n**.

	D_{ij}	Data for the characters. Each character from **Font A** is defined with **48 bytes**. Each character from **Font** B is defined with **16 bytes** for **subcommand 3** (the 9-th horizontal bit is always white) and with **32 bytes** for **subcommand 4** (2 bytes for each horizontal row, only the most significant bit of the second byte is used). The data for character set **(font) A** is composed from left to right and from top to bottom with two bytes for each horizontal line. From the second byte only the first nibble (the most significant 4 bits) is valid. Each bit defines one dot, 1 is for black, starting from the most significant bit.
		Downloaded characters are valid even after switching off the printer

28. (ESC !) Specifying printing mode of text data

Code	**[1Bh] + [21h] + n**
Description	Data is given in binary code. Each **n** bit indicates the following:

Bit	Function	Value 0	Value 1
0	Character Font	A (12x24)	B (9x16)
1	Undefined		
2	Undefined		
3	Highlighting	Canceled	Specified
4	Double Height	Canceled	Specified
5	Double Width	Canceled	Specified
6	Undefined		
7	Underline	Canceled	Specified

An underline is attached to the full character width, which, however, is not attached to the part having been skipped by the horizontal tab.

Neither is it attached to 90°-right-turned characters.

The underline width is as having been specified by **ESC -**.
The default setting: 1 dot width.

	Highlighting is valid for character **font A (12x2**4) and **font B (9x16)**. It is not recommended to be used for font B because text is not readable. If at same time are given double height and/or double width and to 90°-right-turning of character, then the sequense of execution is as follows: • Characters is doubled in the direction indicated; • Character is turned at 90°-right-angle.

29. (ESC *) Printing graphical data

Code	**[1Bh] + [2Ah] + m + n1 + n2 + D_1+ … + D_k**	
Description	**m** (0,1, 20h or 21h)	Graphics mode (see table below).
	0 <= **n1** <= FF	specifies the number of dots in horizontal line (LSB).
	0 <= **n2** <= 09	specifies the number of dots in horizontal line (MSB).
	D_i (**i** from 1 to **k**)	Bit image data.
	The number of dots in horizontal direction is **n1+n2*256**. Number of data bytes **k** is: **n1 + 256*n2** for modes **0** and **1** **(n1+256*n2)*3** for modes **20h** and **21h** The bits subject to printing are taken as **"1"** and those not as **"0".** Bit image data is sent starting from the top to bottom and from the left to right (vertical columns scanning). In modes **m=0 and** 1 only **one byte** per column is sent and in mode **m=20h, 21h** – **3 bytes** for each column are sent.	

		Vertical Direction		Horizontal Direction	
m	**Mode**	**Dots**	**Dot density**	**Dot density**	**Max. dots**
0	8 dots single density	8	67 DPI	101 DPI	204/288
1	8 dots double density	8	67 DPI	203 DPI	408/576

20h	24 dots single density	24	203 DPI	101 DPI	204/288
21h	24 dots double density	24	203 DPI	203 DPI	408/576

When the values set in **m** or **n2** are out of the above range, the data is processed as normal printing data.

If some part of the graphic or the entire graphic is outside the printable area, then graphics data are accepted, but only the needed part of them are printed.

In page mode and rotated by 90 degrees page the max. dot count is larger than the numbers in the table above.

This command has one more version with 3 new modes:

Code	**[1Bh] + [2Ah] + m + n + { a + [00h] } +D_1 + … +D_k**	
Description	Designates a bit image of **n*8** dots horizontal and by **24** or **a** dots vertical. Depending on **m** there is compression of data. All 3 modes are with high dot density (203x203 dpi).	
	m can be:	
	10h	Not compressed data with height 24 lines. Byte **a** and byte **00h** are not sent.
	11h	Compressed data with height 24 lines. Byte **a** and byte **00h** are not sent.
	12h	Compressed data with height **a** lines.
	0 <= **n** <= FFh	Defines horizontal size.
	D_i	The bit image data
	Their number is **n*24** bytes for mode **10h**. The compressed data in mode 11h must give same number of bytes, but after the decompression. The number of data bytes for mode **12h** must be **a*n** (after decompression). Decompression in modes **11h** and **12h** is similar to the one used in PCX monochrome graphic mode. If the 2 most significant bits of the consecutive byte are 1, so the next define a counter of iterations from **0 to 63**, and the next byte contains the data that has to be repeated.	

	If at least one of the most significant bytes is **0**, the byte contains data which is directly used. If the data for the printer contains a byte with two most significant bits **1**, it has to be sent as 2 bytes with counter **1**. Data for both modes is sent horizontally, from right to left and from top to bottom. Each byte contains **8** points, the "1"-s are black starting from the most significant bit.

A new mode for printing vertical lines added

Code	**[1Bh] + [2Ah] + [18h] + L + n + R**	
	L	Offset (white dots) before the vertical line. From **0** to **255**.
	n	Vertical line thickness in dots. From **0** to **255**.
	R	Offset (white dots) after the vertical line. From **0** to **255**.
Description	The command prints a vertical black line with thickness **n** and height – the whole height of the line (including the space between the lines set with commands **ESC 2**, **ESC 3** or **ESC J**). The printer adds **L** dots to the current X coordinate, draws the line and adds **R** dots to the X coordinate after the line. The purpose of the command is to draw tables independent of the type or of the font of the printed symbols between the vertical lines.	

New modes for printing graphics are added.

Code	**[1Bh] + [2Ah] + [13h] + n1 + n2 + a +D_1 + … +D_k** or **[1Bh] + [2Ah] + [14h] + n1 + n2 + a +D_1 + … +D_k**	
Description	**n1**	Lower part of bytes count in horizontal direction. From **0** to **255**.
	n2	Higher part of bytes count in horizontal direction. From **0** to **1**.
	a	Vertical size of the image in dots. From **1** to **24**. For command **ESC * [13h]** data for a bit image with size (**n1+256*n2)*8** dots horizontally and **a** dots vertically are sent, with data compression (exactly as in command **ECS * [12h]**). The graphics mode is single density (203x203 dots/inch).

	For command **ESC * [13h]** data for a bit image with size (**n1+256*n2)*8** dots horizontally and **a** dots vertically are sent, with data compression (exactly as in command **ECS * [12h]**). The graphics mode is single density (203x203 dots/inch). Data bytes count is **a*(n1+256*n2)** after decompression. For command **ESC * [14h]** data are without compression like **ESC * [10h]** command. The commands are added to make printing of graphics in page mode easier – in page mode with page height more than 2040 dots and print direction 90 or 270 degrees it is not possible to fill the whole page height using only one of the older commands for compressed graphics (**ESC * [11h]** and **ESC * [12h]**).

30. (ESC -) Selecting/Cancelling Underline

Code	**[1Bh] + [2Dh] + n**	
Description	An underline is attached to the full character width. It is, however, not attached to the part having been skipped by horizontal tab command. An underline is not attached to a **90°- right-turned** characters.	
	The following values of **n** are possible:	
	0 or **30h**	Canceling an underline.
	1 or **31h**	Specifying an underline for 1-dot width.
	2 or **32h**	Specifying an underline for 2-dots width.
	This command only selects the underline thickness. For specifying/canceling the Underline mode command ESC ! **([1Bh] + [21h]**) must be used.	

31. (ESC .) Printing Self Test/diagnostic information

Code	**[1Bh] + [2Eh]**
Description	Prints test page and self-diagnostic information. The self-diagnostic information includes print density, print head temperature, battery voltage, baud rate in case of work via RS232 and others.

32. (ESC 2) Specifying 1/6-inch line feed rate

Code	**[1B] + [32h]**
Description	If in the line there are symbols that will not fit in the defined size, the line automatically is set to be of the necessary height so they fit.

33. (ESC 3) Specifying line feed rate n/203 inches

Code	**[1Bh] + [33h] + n**
Description	**n** is **from 0 to 255**. Default value is **n**=22h (1/6 inches).

34. (ESC <) Changes print direction to opposite

Code	**[1Bh] + [3Ch]**
Description	The command changes current print direction. It is needed when using Hebrew and Arabic code tables, but is working for all code tables. Default print direction is from right to left for code tables 19, 21, 22, 23, 24 and from left to right for all others.
The command is supported in firmware **version 1.51** or higher.	

35. (ESC =) Data input control

Code	**[1Bh] + [3Dh] + n**
Description	The command is used for selecting a peripheral device, which will receiving incoming data. **n** can be from **0** to **255**, but only the LSB is of significance. **Value 1** or **'1'**: A printer is selected only. **Value 0, '0', 2** or **'2':** A customer display is selected only. **Value 3** or **'3':** A printer and a customer display are selected. When a customer display is selected only (**n=2**), all data, except this command and the real-time commands, are ignored.. When turning **ON** the printer, selected peripheral device is specified by memory switch **13**, as well if executing a command **(ESC @)** and **n** was **3** or **'3'**.

36. (ESC >) Select print direction

Code	**[1Bh] + [3Eh] + n**	
Description	Possible values for **n**:	
	0 or '**0**'	Default direction for the selected code table.
	1 or '**1**'	Left to right direction forced.
	2 or '**2**'	Right to left direction forced.
	The command sets the print direction. It is needed when using Hebrew and Arabic code tables, but is working for all code tables. Default print direction is from right to left for code tables 19, 21, 22, 23, 24 and from left to right for all others. Commands **ESC <** and **ESC >** work together. The sequence, which selects the direction, is as follows: • The print direction is set according to the currently selected code table.	
	• If command **ESC >** with argument > 0 was executed since last **ESC u** command, then this is the print direction. • If command **ESC <** was executed after this, the print direction is changed to the opposite.	
The command is supported in firmware **version 1.51** or higher.		

37. (ESC @) Initializing the printer

Code	**[1Bh] + [40h]**
Description	Clears data stored in the print buffer and brings various settings to the initial state (Default state). Data (items) in serial buffer are not cleared.

38. (ESC D) Setting horizontal tab position

Code	**[1Bh] + [44h] + n_1 + … + n_k + [00h]**
Description	**n_i** indicates the number of the column from the beginning to the horizontal tab position, minus 1. For example, to set the position at **9th** column, **n=8** is to be specified. **n_i** is from **0** to **255**
	The tab position is set at position where it is “character width multiplied by **n_i**” from the line beginning. The character width, at this time, includes the rightward space amount. In double wide characters, it is made double of the ordinary case. Tab positions can be specified are maximum **32**. **ESC D [00h]** clears all the set tab positions. Following clearing, horizontal tab command is ignored.

39. (ESC E) Specifying / Canceling Highlighting

Code	**[1Bh] + [45h] + n**
Description	**n** can be from **0** to **25**5, but only the least significant bit is of significance. **Value 0:** Canceling highlighting. **Value:** Highlighting is specified.
	This is effective for character font **A (12x24)** and font **B (9x16)**. It is **not** recommended to be used for **font B** because text is **not readable**.

40. (ESC F) Filling or inverting the page area in page mode

Code	**[1Bh] + [46h] + n**	
Description	Allowed values for **n**:	
	0 or ‘**0**’	The area is cleared (white)
	1 or ‘**1**’	The area is filled (black)
	2 or ‘**2**’	The area is inverted.
	The command fills the selected with **ESC W** page with the desired color or inverts it. The command is not valid in standard mode.	
The command is supported in firmware **version 1.51** or higher.		

41. (ESC G) Specifying / Canceling highlighting

Code	**[1Bh] + [47h] + n**
Description	The same as command **ESC E**.

42. (ESC I) Specifying / Canceling Italic Print

Code	**[1Bh] + [49h] + n**
Description	**n** can be from **0** to **25**5, but only the least significant bit is of significance. **Value 0:** Normal Print **Value 1:** *Italic* Print

43. (ESC J) Printing and Paper Feed n/203 inches

Code	**[1Bh] + [4Ah] + n**
Description	Prints data in the print buffer and feeds paper by **n/203** inch. **n** can be from **0** to **255**. This function is temporary and does not affect the feed operation thereafter. When **n=0** the paper is fed by **1/203** inch**.**

44. (ESC L) Selecting page mode

Code	**[1Bh] + [4Ch]**
Description	The command switches from standard mode to page mode. In this mode the printing is not immediately, but is accumulated in a reserved for this purpose memory area. The resulting image is printed using one of the commands **ESC FF**, **GS FF** or **GS Z**. The page area is the maximum (**576 x 2432** dots for wide paper or **408x 2432 dots** for narrow paper) or the result of the last executed command **ESC W**. The print direction is the default (left to right) or the result of the last executed command **GS T**. The current print position is (0, 0) depending on the selected print direction. The command is not valid in page mode.
The command is supported in firmware **version 1.51** or higher.	

45. (ESC N) Reading programmed serial number

Code	**[1Bh] + [4Eh]**
Description	The command returns the programmed serial number of the printer as an ASCIIZ string. Number length is **13** characters. If no serial number is programmed, then only one symbol is returned – **00h**.
The command is supported in firmware **version 1.51** or higher.	

46. (ESC R) Selecting Country

Code	**[1Bh] + [52h] + n**
Description	**n** can be from **0** to **13** and has the following meaning:

No	Character Set	Changed Characters											
		23h	24h	40h	5Bh	5Ch	5Dh	5Eh	60h	7Bh	7Ch	7Dh	7Eh
0	U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
1	France	#	$	à	º	¢	§	^	`	é	ù	è	¨
2	Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3	U.K.	£	$	@	[	\	]	^	`	{	|	}	~
4	Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5	Sweden	#	$	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	$	@	º	\	é	^	ù	à	ò	è	ì
7	Spain I	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
8	Japan	#	$	@	[	¥	]	^	`	{	|	}	~
9	Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
12	Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
13	Korea	#	$	@	[	₩	]	^	`	{	|	}	~

47. (ESC S) Specifying speed (bps) of the serial port

Code	**[1Bh] + [53h] + n**	
Description	Sets new communication speed for the serial interface.	
	Possible values of parameter **n**:	
	0 or **'0'**	1200 bps
	1 or **'1'**	2400 bps
	2 or **'2'**	4800 bps

	3 or **'3'**	9600 bps
	4 or **'4'**	19200 bps
	5 or **'5'**	57600 bps
	6 or **'6'**	115200 bps
	7 or **'7'**	38400 bps
	The command is valid only when the printer is connected through a serial cable. The last setting is valid after switching OFF and ON the printer. Default value is **6 (115200 bps).**	

48. (ESC T) Printing short self test

Code	**[1Bh] + [54h]**
Description	Prints current printer parameters, including intensity, temperature of the print head, battery voltage, speed in case of serial connection, etc.

49. (ESC U) Selecting / Canceling underlined printing

Code	**[1Bh] + [55h] + n**	
Description	Possible values for **n**:	
	0 or **'0'**	Canceling underlined characters.
	1 or **'1'**	Specifying underlined characters.
	No underlines are attached to 90°-right- turned characters.	

50. (ESC V) Selecting / Canceling printing 90°- right turned characters

Code	**[1Bh] + [56h] + n**
Description	**n** can be from **0** to **255**, but only the least significant bit is of significance: **Value 0:** Canceling 90°-right- turned Characters. **Value 1:** Specifying 90°-right- turned Characters.

51. (ESC W) Defining the print area in page mode

Code	**[1Bh] + [57h] + xL + xH + yL + yH + dxL + dxH + dyL + dyH**	
	xL and **xH** **yL** and **yH** **dxL** and **dxH** **dyL** and **dyH**	Low and high byte of the horizontal offset of the relative top left corner of the page. Low and high byte of the vertical offset of the relative top left corner of the page. Low and high byte of the width of the page. Low and high byte of the height of the page.
Description	The command defines the relative position and size of the page. In page mode the new values are active immediately, in standard mode they are memorized and used after entering page mode. The print position has coordinates (**0**, **0**) depending on the currently selected print direction (command **GS T**). If the relative position is invalid, the command is not accepted. If only a part of the selected page is in the printable area (current paper width and maximal height of **2432 dots**), this area is used as page area. The default page size is **576 x 2432 dots** in wide paper mode or **408 x 2432 dots** in narrow paper mode.	
The command is supported in firmware **version 1.51** or higher.		

52. (ESC X) Specifying max printing speed

Code	**[1Bh] + [58h] + n**	
Description	**n** is between **0** and **3** or between **'0'** and **'3'**:	
	0 or **'0'**	220 mm/s (8.8 inch/s)
	1 or **'1'**	150 mm/s (6.0 inch/s)
	2 or **'2'**	100 mm/s (4.0 inch/s)
	3 or **'3'**	50 mm /s (2.0 inch/s)
	Default value is 0 (60 mm/s).	
	The defined speed is recommended and can be achieved with not very cold printing head and comparatively little data to print in the line (less black).	

53. (ESC Y) Selecting intensity level

Code	**[1Bh] + [59h] + n**	
Description	**n** is between **0** and **6** or between **'0'** and **'6'**:	
	0 or **'0'**	Intensity 60 %
	1 or **'1'**	Intensity 75 %
	2 or **'2'**	Intensity 90 %
	3 or **'3'**	Intensity 100 %
	4 or **'4'**	Intensity 120 %
	5 or **'5'**	Intensity 140 %
	6 or **'6'**	Intensity 160 %
	Default value is 3 (100%).	
	Higher intensity can cause decrease in printing speed.	

54. (ESC Z) Returning diagnostic information

Code	**[1Bh] + [5Ah]**	
Description	The printer will return 32 bytes of information with the following structure:	
	1-22	Printer name up to **22** charachters**.**
	23-25	Firmware version – **3 digits.**
	26-27	Language version, described **by two characters**.
	28-32	**5 bytes** with flags. When the corresponding bit is **1**, the function is supported and when **0**, the function is not supported.
	Bits are listed below:	

Bit	**Meaning**
28.0	Supports IrDA mode.
28.1	Mag-stripe reader support.
28.2	Supports reading of all 3 tracks on magnetic card.
28.3	Katakana support, ASCII codes above 127 contain Katakana characters.
28.4	JIS and Shift-JIS support.
28.5	Prints in commands **ESC .** and **ESC T** and in command **ESC `** returns temperature in ° Fahrenheit.

28.6	Bluetooth support.
28.7	Reserved – always is 1.
29.0	Update via firmware interface.
29.1	Korean characters support.
29.2	BLACK MARK mode support.
29.3	Barcode reader support.
29.4	USB support.
29.5	Not in use.
29.6	Page mode support
29.7	Reserved – always is 1.
30.0	GB2312 (Simplified Chinese) support
30.1	BIG5 (Traditional Chinese) support
30.2	Not in use
30.3	Not in use
30.4	Not in use
30.5	Not in use
30.6	Not in use
30.7	Reserved – always is 1
31.0	State of flag 1 – determined in command **GS)**
31.1	State of flag 2 – determined in command **GS)**
31.2	State of flag 3 – determined in command **GS)**
31.3	State of flag 4 – determined in command **GS)**
31.4	State of flag 5 – determined in command **GS)**
31.5	State of flag 6 – determined in command **GS)**
31.6	Not in use
31.7	Reserved – always is 1
32.0	State of flag 8 – determined in command **GS)**
32.1	State of flag 9 – determined in command **GS)**
32.2	State of flag 10 – determined in command **GS)**
32.3	State of flag 11 – determined in command **GS)**
32.4	State of flag 12 – determined in command **GS)**
32.5	State of flag 13 – determined in command **GS)**
32.6	Not in use
32.7	Reserved – always is 1

55. (ESC \) Specifying relative horizontal position

Code	**[1Bh] + [5Ch] + n1 + n2**	
Description	0 <= **n1** <= FFh	Specifying number of dots from current position in horizontal (LSB).
	0 <= **n2** <= FFh	Specifying number of dots from current position in horizontal (MSB).
	The printing start position is specified with **n1 + 256*n2** dots. Specifying exceeding the top of line or the end of line is ignored. Specifying dots in minus (left) direction from the current one, is the **complement** of **N** with **65536 (N=65536 - N).**	

56. (ESC]) Loading the default settings stored in Flash memory

Code	**[1Bh] + [5Dh]**
Description	**The following parameters are read from flash memory and become active:** Speed of communication in serial port. Configuration “switches”. Max printing speed. Print density. Height of printing line. Country. Code table. Height of barcode.
	Width of barcode single line.
	Font of the text (HRI characters) corresponding to the barcode.
	Position of the HRI characters.

57. (ESC ^) Saving current settings in Flash memory

Code	**[1Bh] + [5Eh]**
Description	**The values of the following settings are stored in flash memory:**
	Speed of communication in serial port.
	Configuration “switches”.
	Max printing speed.

	Print density.
	Height of printing line.
	Country.
	Code table.
	Height of barcode.
	Width of barcode single line.
	Font of the text (HRI characters) corresponding to the barcode.
	Position of the HRI characters.
	These setting become default settings.

58. (ESC _) Loading factory settings

Code	**[1Bh] + [5Fh]**
Description	**This command sets the printer in default state with the following settings:**
	All printing attributes like underline, rotating etc. are cleared.
	Internal font A (12 x 24) is selected.
	Pitch between lines is 1/6 inch.
	Barcode height is 80 dots, and barcode width is 3.
	All downloaded fonts and bit images are cleared.
	Printing speed is set to 60 mm/s.
	Print density is 100%.
	Communication speed is set to 115200 bps.
	Code table becomes 437 (US), and country 0 (US). For Japanese version default values are: Code table Katakana and country Japan.

59. (ESC `) Returning voltage and printer head temperature

Code	**[1Bh] + [60h]**
Description	Returns **2 bytes** of information – the first one is **voltage** returned in the format: **voltage x 10 + 20H** and second is head **temperature** returned in the format: **head temperature + 20H**.

60. (ESC a) Aligning the characters

Code	**[1Bh] + [61h] + n**	
Description	**n** **0** and **2**, or between '**0**' and '**2**':	
	0 or **'0'**	Left end alignment.
	1 or **'1'**	Centering
	2 or **'2'**	Right end alignment
	The default value is 0. After printing of the line the alignment becomes automatically left-justified.	

61. (ESC b) Increasing text line height

Code	**[1Bh] + [62h] + n**
Description	The command adds **n** dots to current text line height. **n** is from 0 to 255. After receiving the every symbol for printing, the printer checks its size (depending on double height attributes, rotation e.c.t.) and sets current line height so, that the whole letter is printed. The command adds additional dots to so calculated line height.
	The maximum line height is 48 dots above base line (the line, at which the bottom of most latin letters is, for example the letter 'A'). If adding **n** to the current height is larger than maximum height (48), then 48 is set as height. If no text or graphic data in line, the command is not executed. The difference between line height in commands **LF**, **ESC 2**, **ESC 3** and **ESC J** is that the height is increased above the letters. The command is useful when inverting a text line in XOR ruled lines mode.
The command is supported in firmware **version 1.51** or higher.	

62. (ESC c5) Enabling/Disabling the functioning of the button LF

Code	**[1Bh] + [63h] + [35h] + n**
Description	**n** can be from **0** too **255**, but only the least significant bit is of significance. **Value 0**: Button **LF** is valid. **Value 1:** Button **LF** is invalid. **Default value is 0.**

63. (ESC d) Printing and feeding paper by n-lines

Code	**[1Bh] + [64h] + n**
Description	**n** can be from **0** to **255**. Prints data inside the buffer and feeds paper by **n** lines. The beginning of the line is to be considered as the next printing start position. When **n=0** paper is fed with 1 line.

64. (ESC f) Select symbol '0' printing style

Code	**[1Bh] + [66h] + n**
Description	Possible values for **n**: **0** or **'0'** Slash zero is printed **1** or **'1'** Non-slash zero is printed Selected value is stored to flash-memory. Default value is 0 for all versions except Japanese.
The command is supported in firmware **version 1.51** or higher.	

65. (ESC i) Feeding paper backwards

Code	**[1Bh] + [69h]**
Description	If the paper has been fed forward with command **ESC o**, then it returns backwards. The feed is exactly the same as it was defined in command **ESC o**, but in reverse direction. If paper has not been fed forward then this command is ignored.

66. (ESC o) Temporarily feeding paper forward

Code	**[1Bh] + [6Fh] + n**
Description	**n** can be from **0** to **255**. This command temporarily feeds paper forward with the defined number of steps **n** (1/8 mm). At command **ESC i** or at first command for printing the paper feeds backwards.

67. (ESC p) Generating a drawer pulse

Code	**[1Bh] + [70h] + m + t1 + t2**	
Description	**m**	one byte and its value is not significant
	t1	one byte pulse ON time [t1 x 2ms]
	t 2	one byte pulse OFF time [t2 x 2ms]
OFF time (t2) must be 4 time longer, than **ON time (t1)** – **((t1 x 4) <= t2).**		

68. (ESC r) Full command for sounding buzzer

Code	**[1Bh] + [72h] + Data**		
Description	This command is used for making (beeping) a sequence of sounds with a certain frequency and duration.		
	The data is in format, similar to the one used for writing notes and can be of any length. The first invalid character cancels the command.		
	Data format:		
	Notes:	a Latin letter of value from '**A**' to'**G**'.	
		'C'	Do
		''D'	Re
		'E'	Mi
		'F'	Fa
		'G'	Sol
		'A'	La
		'B'	Si
	If immediately after the note comes character **'#'**, then the note is higher in pitch by a semitone **(sharp).** If immediately after the note comes character **'&'**, then the note is lower in pitch by a semitone **(flat).**		
	Pause:	Character space **(ASCII 20h).**	
	After a note or pause there can be one or a few bytes, which specify the duration. Valid are characters from **'0'** to '**5**', they have the following meaning:		

		‘0’	Basic duration of a note/pause.
		‘1’	Basic duration * 2.
		‘2’	Basic duration * 4.
		‘3’	Basic duration * 8.
		‘4’	Basic duration * 16.
		‘5’	Basic duration * 32.
	If there are a few durations one after another they are summed up.		
	Going to higher scale:		character **‘+’**
	Going to lower scale:		character **‘-’**
	Specifying tempo:		character **‘^’**
	The character **‘^’** must be followed by a number. The number specifies the percentage: duration of notes and intervals to basic duration. **Values:**		
		‘1’	200 %
		‘2’	175 %
		‘3’	140 %
		‘4’	120 %
		‘5’	100 %
		‘6’	80 %
		‘7’	60 %
		‘8’	50 %
		‘9’	40 %
	Return to scale 1 (it is default).		Character **‘@’**
	Tone **‘La’** in it is **440 Hz**.		
	It is recommended that the data ends with ASCII code **03h**, although any other non-printing character will also stop the command.		

69. (ESC s) Reading current printer settings

Code	**[1Bh] + [73h] + n**	
Description	This command returns current settings or loaded data in printer. Possible values for **n**:	
	0 or '**0**'	Current settings from flash memory are returned in following order: • Memory switches – 13 digits **0** or **1**. • Serial port speed (bauds) – an integer. • Country number (from command **ESC R**) – an integer. • Current character table (from command **ESC u**) – an integer.
		• Print density (from command **ESC Y**) – an integer. • Print speed (from command **ESC X**) – an integer. • EURO symbol position (from command **ESC #**) – an integer from 0 to 255. Field separator is '**,**'.
	1 or '**1**'	Current settings from printer RAM are returned. The format of data is the same as for subcommand **0**.
	2 or '**2**'	The currently loade graphic logo is returned in format: **w h** $\mathbf{D_i}$, where: **w** Graphics width in bytes (**pixels*8**). **h** Graphics height in pixels. $\mathbf{D_i}$ Graphics data – **2*w*h** bytes in the sequence as in command **GS ***. Data are in hexadecimal format (each byte sent as two hexadecimal symbols). Data are in hexadecimal format (each byte sent as two hexadecimal symbols).
The command is supported in firmware **version 1.51** or higher.		

70. (ESC u) Selecting Code table

Code	**[1Bh] + [75h] + n**	
Description	Values for **n**:	
	0	ENGLISH (437)
	1	LATIN 1 (850)
	2	PORTUGUESE (860)
	3	LITHUANIAN
	4	LATIN 2 (852)
	5	POLISH
	6	TURKISH (857)
	7	BALTIC (775)
	8	BULGARIAN (856)
	9	RUSSIAN (866)
	10	LATVIAN
	11	GREEK (737)
	12	HEBREW (862)
	13	WESTERN (1252)
	14	CE (1250)
	15	TURKISH (1254)
	16	BALTIC (1257)
	17	CYRILLIC (1251)
	18	GREEK (1253)
	19	HEBREW (1255)
	20	KATAKANA
	21	ARABIC

	22	ARABIC (1256)
	23	ARABIC (1256 with Arabic digits and punctuation)
	24	ARABIC (1256 with Farsi Arabic digits and punctuation)
	When the printer is switched ON it is loaded the default code table which is stored in flash-memory.	

Addition information about Arabic code tables:

When selected, the default print direction is from right to left (the same for **code table 19 – Hebrew**). The print direction can be changed using commands **ESC >** and **ESC <**.

Arabic symbols are larger than the symbols in from the other code tables (**16 dot**s for font **A** and **12 dots** for font **B**). Depending on the position of the letter in a word, Arabic letters may have **up to 4 different forms** – single letter, right form, middle form and left form.

Code table **21** includes all forms of every letter, so the application program has to select the correct ASCII code. When using code tables **22, 23 and 24**, the printer automatically selects the correct letter form dependant on its neighbours. If it is needed to print directly a form of the letter when one of the pages **22, 23 or 24** is selected, the **ASCII code 7Fh** is sent to the printer – the first symbol after it is taken directly from code table **21**.

Code table 23 differs from **22** by that the digits and some of the punctuation marks are changed with Arabic. Table **24** differs from **23** by that the Arabic digits are Farsi variant (3 of them are different).

For Japanese and Chinese versions of the printer only:

When one of the Arabic code tables is selected, then two-byte Asian letters are not accessible – a non-Arabic code page must be selected to print them.

71. (ESC v) Transmitting the printer status

Code	**[1Bh] + [76h]**	
Description	The printer returns one byte whose bits have the **following meaning**:	

Bit	**Value 0**	**Value 2**
0	Not in use	
1	Not in use	
2	There is paper and paper cover is closed	There is no paper or paper cover is opened
3	Printing head is with normal temperature	The printing head is overheated
4	Not in use	
5	No auto cutter error	Auto cutter is blocked
6	There is no paper near end	Paper near end
7	Not in use	

72. (ESC y LAN) Programming setting LAN

Code	**[1Bh] + [79h] + [4Ch] + [41h] + [4Eh] + [3Ah] + Data**
Description	**Data format**: **T_1 + D_1 + T_2 + D_2 + … + [00h]** **Ti** – one byte, selecting the data type, which follows. Possible values: **01h IP Address:** 8 hexadecimal symbols. **02h Subnet Mask:** 8 hexadecimal symbols. **03h Default Gateway:** 8 hexadecimal symbols. **04h Port:** 4 hexadecimal symbols.
Not all fields are obligatory. Missing fields don't change values.	

73. (ESC {) Enabling/Canceling printing of 180° turned characters

Code	**[1Bh] + [7Bh] + n**
Description	**n** can be from **0** to **255**, but only the least significant bit is of significance. **Value 0:** Cancel printing of 180° turned characters. **Value 1:** Enable printing of 180° turned characters.
	Default value is 0. **The whole line is turned.**

74. (GS FF) Printing in page mode and returning to standard mode

Code	**[1Dh] + [0Ch]**
Description	The command prints the image in the currently defined page and leaves page mode. **All the page memory is erased.**
The command is supported in firmware **version 1.51** or higher.	

75. (GS $) Specifying the absolute vertical position in page mode

Code	**[1Dh] + [24h] + nL + nH**	
Description	**nL**	Lower byte of the new vertical position
	nH	Higher byte of the new vertical position
	The command sets new vertical print position. If the position is outside the currently active page, the command is not accepted. The real new coordinates depend on the print direction (selected using **GS T**). The command is invalid in standard mode. The horizontal position is changed with commands **ESC $** and **ESC ** – they work both in page and standard mode.	
The command is supported in firmware **version 1.51** or higher.		

76. (GS)) Setting printer flags (memory switches)

Code	**[1Dh] + [29h] + f1 + f2 + … + f13**		
Description	This model has 13 memory switches and selecting, releasing, and changing a function is available with this command. With this command can be set 13 flags (memory switches), they are switched ON or OFF. Memory switch setting is retained even after printer power off. These flags are like virtual switches defining the state of the printer.		
	f_i is the flag that we want to switch ON or OFF. All flags must be set. **Possible values are:**		
	'0'	Flag is OFF.	
	'1'	Flag is ON.	
	'.'	Flag stays unchanged.	
	Meaning of different flags:		
	Flag	**OFF**	**ON**
	1	Power on/off sound disabled	Power on/off sound enabled

		2	CR (ASCII code 13) is not executed
		3	LF (ASCII code 10) is executed
		4	LF immediately after CR as selected by flag 3
		5	Default is font A (12x24)
	6	78 mm paper roll	58 mm paper roll
	7	Reserved	
	8	Hardware flow control	Xon/Xoff flow control
	9	USB interface disabled	USB interface enabled
	10	USB is ALWAYS in mode DEVICE	
	11	USB е в режим HOST	USB е в режим DEVICE
	12	Cutter enabled	Cutter disabled
	13	Default select printer	Default select customer display

77. (GS *) Defining a Downloaded Bit Image (logo)

Code	**[1Dh] + [2Ah] + n1 + n2 + D_1 + … + D_n**	
Description	**n1**	Between **0** and **127**. It defines the horizontal size of the downloaded image.
	n2	Between **0** and **248**. It defines the vertical size of the downloaded image.
	D_i	The data for the bit image. This data consists of **n1*n2** bytes, from left to right and from top to bottom, but **n1** bytes in each horizontal line (**n1*8** dots) and **n2** lines. Each bit defines a dot, 1 corresponds to black. Total number of bytes cannot be bigger than 16 kB.
	The command defines a bit image that contains number of dots, defined by **n1** and **n2**. Image is stored and after the printers is switched off. Selececting value **0** for **n1** and/or **n2** deactivates (deletes) the logo. By default there is no logo image in the printer. The so defined bit image is printed with command **GS /**	

78. (GS /) Printing a Downloaded Bit Image (logo)

Code	**[1Dh] + [2Fh] + m**
Description	**m** defines the printing mode and **can be**:

m	**Mode**	**Vertical dots**	**Horizontal dots**
0	Normal	203 DPI	203 DPI
1	Double width	203 DPI	101 DPI
2	Double height	101 DPI	203 DPI
3	Double height and double width	101 DPI	101 DPI

When a download bit image has not been defined, this command is ignored.

Command **ESC @** (initialization of the printer) does not clear downloaded bit image.

A portion of a download bit image exceeding one line length is not printed.

79. (GS :) Starting/Ending macro definitions

Code	**[1Dh] + [3Ah]**
Description	Specifies starting/ending macro definition. Maximum content available for macro definition is **4094 bytes**. **After the last byte of data, the command is sent once again to define the end.** Even with **ESC @** (initialization of the printer) having been executed, defined content is not cleared. Therefore, it is **possible to include ESC @ into the content of macro definition.** Normal printing operation is carried out even while in macro definition.

80. (GS B) Enable / Disable inverse printing (white on black)

Code	**[1Dh] + [42h] + n**
Description	**n** is from **0** to **25**5, but only LSB is checked. **Value 0**: Disable inverse printing. **Value 1:** Enable inverse printing. **Default value: 0.**

81. (GS C) Read the Real Time Clock

Code	**[1Dh] + [43h]**	
Description	The command returns the current value of the RTC as string.	
	Returned data format (21 bytes):	
	YY MM DD WW hh mm ss[00h]	
	YY	Year without the century **(00-99)**
	MM	Month **(01-12)**
	DD	Day **(01-31)**
	WW	Day of the week **(01-07)**
	hh	Hour **(00-23)**
	mm	Minutes **(00-59)**
	ss	Seconds **(00-59)**
	Field separator is space symbol (ASCII 32h). Data are terminated with ASCII **00h**. The command exists in printer **versions 1.51 or newer.**	

82. (GS H) Selecting Printing position of HRI Code

Code	**[1Dh] + [48h] + n**	
Description	Selecting printing position of HRI code when printing barcodes. **n** is between **0** and **3** or between **'0'** and **'3'**:	
	Value:	**Printing position:**
	0	No printing
	1	Above the barcode
	2	Below the barcode
	3	Both above and below the barcode

83. (GS L) Setting the left margin

Code	**[1Dh] + [4Ch] + n1 + n2**
Description	This command sets the position in dots (1/203 inches), from which begins printing of each line. This command only works when it is entered at the beginning of a line. The value of the left margin is **n1+256*n2** dots. **Default value is 0.**
The command is valid in standard mode only.	

84. (GS Q) Printing 2-D (two dimensional) barcodes

Code	**[1Dh] + [51h] + n + …**			
Description	**n** selects the type of barcode:			
	2 or '**2**': **PDF417**		**6** or '**6**':	**QR Code**
PDF417				
Code	**[1Dh] + [51h] + n + Type + EncMode + ECCL+Size +nl + nh +Data$_i$**			
Description	**Type**	PDF417 type		
		0: Standard	**1**:	Truncated
	EncMode	Encoding mode		
		0: Automatic most suitable encoding	**1**:	Binary encoding
	ECCL	Error correction control level. Possible values **0** to **9.** **ECCL**=9 automatically selects correction level dependent on data length.		
	Size	Specify one from the bellow table: (**X:** bar width, **Y:** row height).		
	0	X=2, Y=4	**8**	X=12, Y=4

	1	X=2, Y=9	**9**	X=12, Y=9
	2	X=2, Y=15	**10**	X=12, Y=15
	3	X=2, Y=20	**11**	X=12, Y=20
	4	X=7, Y=4	**12**	X=20, Y=4
	5	X=7, Y=9	**13**	X=20, Y=9
	6	X=7, Y=15	**14**	X=20, Y=15
	7	X=7, Y=20	**15**	X=20, Y=20
	nl, nh	Specify lower byte and upper byte of data size **(1 to 384).**		
	Data$_i$	Data bytes		

QR Code

Code	**[1Dh] + [51h] + n + Size + ECCL + nl + nh + Data$_i$**		
Description	**Size**	Size of symbol. **Possible values: 1, 4, 6, 8, 10, 12, 14**	
	ECCL	Error correction control level:	
		1:	L (7%)
		2:	M (15%)
		3:	Q (25%)
		4:	H (30%)
	nl, nh **Data$_i$**	Specify lower byte and upper byte of data size **(1 to 448)**. Data bytes	

85. (GS R) Filling or inverting a rectangle in page mode

Code	**[1Dh] + [52h] + xL + xH + yL + yH + dxL + dxH + dyL + dyH + n**	
	xL and **xH**	Low and high byte of the horizontal position of the top left corner of the rectangle in the active page.
	yL and **yH**	Low and high byte of the vertical position of the top left corner of the rectangle in the active page.
	dxL and **dxH**	Low and high byte of the width of the rectangle.
	dyL and **dyH**	Low and high byte of the height of the rectangle.
	n	Filling mode: **0** or **'0'** Rectangle area is cleared (white).
		1 or **'1'** Rectangle area is filled (black). **2** or **'2'** Rectangle area is inverted.
Description	The coordinates are relative to the left corner of the page, defined using **ESC W** (The print direction doesn't matter). If some part of the rectangle is outside the page, only the part inside the page is filled. The command is invalid in standard mode.	
The command is supported in firmware **version 1.51** or higher.		

86. (GS S) Selecting 2-D barcode cell size

Code	**[1Dh] + [53h] + n**	
Description	This command sets the cell size for two dimensional barcode **QR Code**. **Possible values for n**:	
	0 or **'0'**	Cell size 3.
	1 or **'1'**	Cell size 4.

87. (GS T) Selecting the print direction in page mode

Code	**[1Dh] + [54h] + n**	
Description	The command selects the current print direction and set starting point to (0, 0) according to this direction. Accepted values of **n**:	
	0 or **'0'**	Printing from left to right, feed to bottom. Starting point in left top corner of the page.
	1 or **'1'**	Printing from bottom to top, feed to right. Starting point in left bottom corner of the page.
	2 or **'2'**	Printing from right to left, feed to top. Starting point in right bottom corner of the page.
	3 or **'3'**	Printing from top to bottom, feed to left. Starting point in right top corner of the page.
	In page mode this command changes immediately the print direction. In standard mode the new value is memorized and used after entering page mode.	
The command is supported in firmware **version 1.51** or higher.		

88. (GS U) Selecting standard mode

Code	**[1Dh] + [55h]**
Description	The command switches from page mode to standard mode. The whole memory area of page mode is cleared. **The command is invalid in standard mode.**
The command is supported in firmware **version 1.51** or higher.	

89. (GS V) Paper cutting

Code	**[1Dh] + [56h] + m + n**
Description	**n** is one byte and it uses depend of **m**. **m** is one byte specifies cut mode. **Possible values of m:** **1** or **'1'** – direct paper cutting **n** – not significant

	66 Feeds receipt paper to cutting position and feeds paper **n** more steps **(n x 0.125 mm)**, then cuts receipt. **104** Feeds receipt paper to cutting position and feeds paper **n** more steps **(n x 0.125 mm)**, then cuts receipt and feeds receipt paper back to the printing position.
This option is to reduce top margin of the next receipt after cutting.	

90. (GS W) Setting the print area width

Code	**[1Dh] + [57h] + n1 + n2**
Description	This command sets the print area width in dots (1/203 inches). This command only works when it is entered at the beginning of a line. The defined value of print area width is **n1+256*n2** dots. The default value depends on the mode 58 mm / 78 mm paper roll and is **408 or 576 dots.**
The command is valid in standard mode only.	

91. (GS X) Drawing a rectangular box with selected thickness in page mode

Code	**[1Dh] + [58h] + xL + xH + yL + yH + dxL + dxH + dyL + dyH + n + d**	
	xL and **xH**	Low and high byte of the horizontal position of the top left corner of the box in the active page.
	yL and **yH**	Low and high byte of the vertical position of the top left corner of the box in the active page.
	dxL and **dxH**	Low and high byte of the width of the box.
	dyL and **dyH**	Low and high byte of the height of the box.
	n	Filling mode: **0** or **'0'** Area under the box is cleared (white). **1** or **'1'** Area under the box is filled (black). **2** or' **2'** Area under the box is inverted.
	d	Box thickness (from **1** to 64).

Description	The coordinates are relative to the left corner of the page, defined using **ESC W** (The print direction doesn't matter). If some part of the rectangle is outside the page, only the part inside the page is filled. The box thickness is always to the inner side of the rectangle. **The command is invalid in standard mode.**
The command is supported in firmware **version 1.51** or higher.	

92. (GS Z) Printing the non blank page area only in page mode

Code	**[1Dh] + [5Ah]**
Description	The command checks the whole memory of the page mode. The area from the first horizontal line wit at least 1 black dot to the last such line is printed. The printer does not leave page mode, current page start position and sizes are not changed. The printed width is **576** or **408 dots** depending on the selected paper width.
	The command is invalid in standard mode.
The command is supported in firmware **version 1.51** or higher.	

93. (GS \) Specifying the relative vertical position in page mode

Code	**[1Dh] + [5Ch] + nL + nH**		
		nL	Lower byte of the new vertical position
		nH	Higher byte of the new vertical position
Description	The command sets new vertical print position relative to the current one. If the position is outside the currently active page, the command is not accepted. The real new coordinates depend on the print direction (selected using **GS T**). The command is invalid in standard mode. The horizontal position is changed with commands **ESC $** and **ESC ** – they work both in page and standard mode. The relative vertical offset is **nL + 256*nH** dots. Offsets in negative direction are given as complement of 65536 (**n.=65536 - n**).		
The command is supported in firmware **version 1.51** or higher.			

94. (GS ^) Executing macro

Code	**[1Dh] + [5Eh] + n1 + n2 + n3**		
Description	**n1**	The number of times of macro execution. **Between 1 and 255.**	
	n2	Waiting time on macro execution. Waiting time of n2 x 100 msec is given for every execution. **Between 1 and 255.**	
	n3	Macro execution mode. **Possible values are:**	
		0	Continuous execution: The Macro is executed n1 times continuously at the time intervals specified by **n2**.
		1	Execution by **LF** switch: When **LF** switch is pressed, the macro is executed once.

95. (GS c) Setting the Real Time Clock

Code	**[1Dh] + [63h] + YY MM DD WW hh mm[00h]**	
Description	**YY**	Year without the century **(00-99)**
	MM	Month **(01-12)**
	DD	Day **(01-31)**
	WW	Day of the week **(01-07)**
	hh	Hour **(00-23)**
	mm	Minutes **(00-59)**
	Field separator is space symbol (ASCII 32h). Data are terminated with ASCII **00h**.	
	The command exists in printer **versions 1.51 or newer.** **The command clears the seconds!**	

96. (GS f) Setting the font of HRI characters of the barcode

Code	**[1Dh] + [66h] + n**	
Description	**n** can be the following values:	
	0	Font A.
	1	Font B

97. (GS h) Setting the height of the barcode

Code	**[1Dh] + [68h] + n**
Description	**n** is between **1** and **FFh** and it defines the heights of barcode in dots (1/203 inches). **Default value: n=162.**

98. (GS k) Printing the barcode

Code	**(1) [1Dh] + [6Bh] + m + D_i + [00h]** or **(2) [1Dh] + [6Bh] + m + n + D_i** or **(3) [1Dh] + [6Bh] + m + c + n1 + n2 + D_i**	
Description	**D_i**	The data for the barcode. The number and possible characters depend on the type of barcode and are defined underneath.
	n	It defines the length of the data when 65 <= **m** <= 73..
For 2-D barcode PDF417:		
	n1 and **n2**	They define the length of the data: **N=n1+256*n2.** **Max value is 1000.**
	c	It defines whether the barcode data is compressed. **Possible values are 0 or 1.**

	m	It defines the type of barcode and may be:		
	m (1)	**Тип на баркода**	**Дължина**	**Допустими символи**
	0	UPC-A	11	48 <= D_i <= 57
	1	UPC-E	11	48 <= D_i <= 57
	2	EAN13 (JAN13)	12	48 <= D_i <= 57
	3	EAN 8 (JAN8)	7	48 <= D_i <= 57
	4	CODE 39	–	48 <= D_i <= 57, 65 <= D_i <= 90, 32, 36, 37, 43, 45, 46, 47
	5	ITF	–	48 <= D_i <= 57
	6	CODABAR (NW-7)	–	48 <= D_i <= 57, 65 <= D_i <= 68, 36, 43, 45, 46, 47, 58
	m (2)	**Type of barcode**	**Length**	**Possible characters**
	65	UPC-A	11	48 <= D_i <= 57
	66	UPC-E	11	48 <= D_i <= 57
	67	EAN13 (JAN13)	12	48 <= D_i <= 57
	68	EAN 8 (JAN8)	7	48 <= D_i <= 57
	69	CODE 39	–	48 <= D_i <= 57, 65 <= D_i <= 90, 32, 36, 37, 43, 45, 46, 47
	70	ITF	–	48 <= D_i <= 57
	71	CODABAR (NW-7)	–	48 <= D_i <= 57, 65 <= D_i <= 68, 36, 43, 45, 46, 47, 58
	72	CODE 93	–	0 <= D_i <= 127
	73	CODE 128	–	0 <= D_i <= 127
	75	CODE 128 Auto	–	0 <= D_i <= 127
	76	EAN 128	–	0 <= D_i <= 127

	m (3)	Type of barcode	Length	Possible characters
	74	PDF417	–	0 <= Di <= 255
	If the barcode is wider than the print area for one line, the barcode is not printed.			

Additional information for Code 128:

Code 128 covers the range of ASCII codes from **0 to 127** with the help of 3 code sets **A, B and C**, which can be used in one and the same barcode.

Code set A:

Consists of characters with ASCII codes from 0 to 95 and function characters FNC1, FNC2, FNC3, FNC4, SHIFT, CODEB, CODEC.

Code set B:

Consists of characters with ASCII codes from 32 to 127 and function characters FNC1, FNC2, FNC3, FNC4, SHIFT, CODEA, CODEC.

Code set C:

It is used for coding sections of the barcode which consist only of digits. Each character defines 2 digits, that are coded with ASCII code from 0 to 99. Also possible are function characters FNC1, CODEA, CODEB.

The barcode always begins with one of the characters **CODEA, CODEB** or **CODEC**, which defines the code set that will be used. If necessary the code set can be changed by inserting one of these characters in the barcode. The character following **SHIFT** is treated as a character of code set **B** if the current code set is **A**, and as a character of code set **A** if the current code set is **B**. If a character unacceptable for the current code set is given then barcode is not printed.

Function characters are defined with 2 bytes as follows:

Character	Coding		
	Decimal	Hexadecimal	Text
FNC1	123, 49	7B, 31	{1
FNC2	123, 50	7B, 32	{2
FNC3	123, 51	7B, 33	{3
FNC4	123, 52	7B, 34	{4
CODEA	123, 65	7B, 41	{A
CODEB	123, 66	7B, 42	{B
CODEC	123, 67	7B, 43	{C
SHIFT	123, 83	7B, 53	{S
{	123, 123	7B, 7B	{{

Code 128 Auto uses the same code sets, but the printer test the data and automatically switches between the code sets, trying to print a minimum width barcode. $\mathbf{D_i}$ contains only the real data to be printed.

EAN 128 uses Code 128 code sets, but puts an FNC1 code in the beginning, and if human readable text is enabled, the text is separated in fields (Application identifiers). If any of the fields contains invalid data, the barcode is not printed. Code sets are switched automatically like **Code 128 Auto**.

99. (GS p) Setting for 2D barcode PDF417

Code	**[1Dh] + [70h] + e + c + r**	
Description	**e**	It is an error correction level for barcode **PDF417**. At value **bigger than 8** the printer chooses automatically the appropriate level depending on the quantity of the coded data, else the defined value is being used.
	c	It is the max number of columns, which the printer uses for printing the barcode.
	r	It is max number of rows, which the printer uses for printing the barcode.

100. (GS q) Selecting the height of the module of 2D barcode PDF417

Code	**[1Dh] + [71h] + n**
Description	**n** is between **4** and **32** including and is the height of one line from the barcode. **By default n=18.**

101. (GS w) Selecting the horizontal size (Scale factor) of the barcode

Code	**[1Dh] + [77h] + n**
Description	**n** is between **2** and **4** including and is the number of dots in barcode's fine element width. **By default n=3.**

102. (GS x) Direct text print in page mode

Code	**[1Dh] + [78h] + xL + xH + yL + yH + sX + sY + Attr + D_i + [00h]**	
Description	The command prints a text string in page mode. It allows larger multiplication of the symbols in comparison with the normal text printing (more than 2).	
	xL and **xH**	**X** coordinate of upper left corner of first letter.
	yL and **yH**	**Y** coordinate of upper left corner of first letter.
	sX	Size (multiplication) in horizontal direction. From **1** to **16**.

<table>
<tr><td></td><td>sY</td><td colspan="4">Size (multiplication) in vertical direction.
From 1 to 16.</td></tr>
<tr><td></td><td>Attr</td><td colspan="4">Print attributes. One byte from 0 to 255.
Each bit of Attr indicates the following:</td></tr>
<tr><td colspan="2" rowspan="9"></td><td>Bit</td><td>Function</td><td>Value 0</td><td>Value 1</td></tr>
<tr><td>0</td><td>Font size</td><td>A (12x24 or 24x24)</td><td>B (9x16 or 16x16)</td></tr>
<tr><td>1</td><td colspan="3">Not used</td></tr>
<tr><td>2</td><td colspan="3">Not used</td></tr>
<tr><td>3</td><td>Bold</td><td>Enabled</td><td>Disabled</td></tr>
<tr><td>4</td><td colspan="3">Not used</td></tr>
<tr><td>5</td><td colspan="3">Not used</td></tr>
<tr><td>6</td><td colspan="3">Not used</td></tr>
<tr><td>7</td><td colspan="3">Not used</td></tr>
<tr><td></td><td>Di</td><td colspan="4">Data.
Bytes with ASCII codes below 20h are ignored.</td></tr>
<tr><td></td><td colspan="5">X and Y coordinates are xL+256*xH and yL+256*yH.</td></tr>
<tr><td></td><td colspan="5">The currently active page direction, country and code table are used. From all print attributes only BOLD is used.
After every printed symbol X coordinate is automatically increased by symbol width + character space, multiplied by sX.
If some part of the symbol is not in the selected page area, the symbol is not printed.
The command is executed in page mode only.</td></tr>
<tr><td colspan="6">The command is supported in firmware version 1.51 or higher.</td></tr>
</table>

Option – Asian Languages Support

103.(FS !) Specifying printing mode of two-byte text data

Code	**[1Ch] + [21h] + n**			
Description	Data is given in binary code. Each **n** bit indicates the following:			
	Bit	**Function**	**Value 0**	**Value 1**
	0	**Font size**	24 x 24	16 x16
	1	Undefined		
	2	Undefined		
	3	Double Height	Canceled	Specified
	4	Double Width	Canceled	Specified
	5	Undefined		
	6	Undefined		
	7	Undrline	Canceled	Specified
	An underline is attached to the full character width, which, however, is not attached to the part having been skipped by the horizontal tab. Neither is it attached to 90°-right-turned characters. The underline width is as having been specified by **(FS -)**. **The default setting is 1 dot width.** If at the same time are given double height and/or double width and 90°-right-turning of character, then the sequence of execution is as follows: character is doubled in the direction indicated; character is turned at 90°-right-angle			

104.(FS &) Selecting the two-byte text mode – JIS or GB2312

Code	**[1Ch] + [26h]**
Description	The command selects two-byte characters mode. Depending on the version of the printer, this may be:Each **n** bit indicates the following: **Japanese version: JIS character table**. **First byte** is between **20h** and **7Fh**, **second byte** between **00h** and **7Fh**. If outside this range, one-byte ASCII characters are printed.
	Chinese version: GB2312 (Simplified Chinese). **First** and **second bytes** are between **A0h** and **FFh**. If outside this range, one-byte ASCII characters are printed.

105.(FS -) Selecting/Cancelling Underline for two-byte text mode

Code	**[1Ch] + [2Dh] + n**	
Description	An underline is attached to the full character width. It is, however, not attached to the part having been skipped by horizontal tab command. An underline is not attached to 90°- right-turned characters. **The following values of n are possible:**	
	0 or **30h**	Canceling an underline.
	1 or **31h**	Specifying an underline of 1-dot width.
	2 or **32h**	Specifying an underline of 2-dots width.

106.(FS .) Cancelling the two-byte text mode

Code	**[1Ch] + [2Eh]**
Description	The command cancels two-byte characters mode **(JIS or GB2312 depending on the version)**. **For Japanese version only:** If **Shift-JIS character mode** was selected before using **FS C** command, then the printer returns to Shift-JIS mode instead to one byte ASCII text mode.

107.(FS 2) Defining one custom Kanji character

Code	**[1Ch] + [32h] + c_1 + c_2 + D_1 + … + D_k**
Description	**c_1**=77h, **c_2**=21h-2Fh (JIS) or **c_1**=ECh, **c_2**=40h-4Eh (Shift-JIS) **D_1-D_k** are data bytes. Character data are sent starting from the top to bottom and from the left to right (vertical columns scanning), 3 bytes per column for large (24x24) font and 2 bytes per column for small (16x16) font, MSB first, bit '**1**' is black. 72 data bytes expected for large font, 32 for small font. When large font is selected, then one 24x24 character is defined, otherwise one 16x16 character is defined. Downloaded characters are valid even after switching off the printer. Kanji characters can be downloaded using command **ESC &**, too. In this case data are sent horizontally, like the ASCII characters.
The command is supported in firmware **version 1.29** or higher.	

108.(FS C) Selecting Shift-JIS mode (Japanese version only)

Code	**[1Ch] + [43h] + n**	
Description	The command selects/cancels two-byte characters **mode Shift-JI**S. It is supported only **in Japanese version** of the printer. First byte is between **80h** and **9Fh** or between **E0h** and **FFh**, second byte between **40h** and **FFh**. If outside this range, one-byte ASCII characters are printed. If both **JIS** and **Shift-JIS modes** are selected, the **Shift-JIS mode** is **active**. **The following values of n are possible:**	
	0 or **30h**	Canceling two-byte Shift-JIS mode.
	1 or **31h**	Specifying two-byte Shift-JIS mode.

109.(FS S) Specifying character spacing for two-byte text mode

Code	**[1Ch] + [53h] + n1 +n2**	
Description	The command sets the leftward and rightward space amount for two-byte character mode.	
	n1	It specifies leftward space.
	n2	It specifies rightward space.
	The space amount is set in dot unit (1/203 inch unit). The initial values are **n1**=0 and **n2**=0. When the font size is doubled the space between characters is also doubled. Possible values are from **0** to **63** dots.	

110.(FS W) Selecting double size characters for two-byte text mode

Code	**[1Ch] + [57h] + n**	
Description	**The following values of n are possible:**	
	0 or **30h**	Canceling double size characters.
	1 or **31h**	Specifying double size characters.
	Double size characters may be selected using command FS.	